Preoperative Information Management System using Wireless PDAs

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Personal Digital Assistant (PDA) and wireless communication are currently available in clinical settings. We developed wireless PDA software that assists anesthesiologists in pre-operative patient assessment. The device communicates with the hospital information system through a wireless LAN and is equipped with pre-programmed data entry templates for pre-operative assessment. As a preliminary test of the device, we randomly assigned residents in preoperative assessment to an intervention and a control arm and compared the results.

Server environment

For preoperative information storage, Microsoft SQL Server 2000 was used. The server connects to and synchronizes the information with the hospital information system. The server communicates to the PDA through an SQL Server CE Server Agent that handles HTTP requests by way of Microsoft Internet Information Services.

Client environment

The PDA was a Casio Cassiopeia E-2000 (CPU: Intel Strong ARM 206MHz, ROM 32MB, RAM 64MB, OS: pocket PC 2002). The wireless communication protocol was IEEE 802.11b. For database on the PDA and data synchronization with the server, Microsoft SQL Server CE Client Agent and SQL Server CE Engine were installed.

Software implementation

The software was developed with Microsoft Visual Studio .NET Compact Framework. It is consisting of one form (initial user interface) and multiple controls. Each control is corresponding to a preoperative problem template (e.g. comprehensive items for the assessment for DM). Each control inherits user interface from the initial user interface. The object-oriented programming approach increased the efficiency in the software development and saved the limited memory on the PDA. The database synchronization was implemented using Remote Data Access (RDA) object. Each preoperative problem template contained three major categories (history:Hx, physical exam:PE, and tests) and each category contained multiple items which are essential for preoperative assessment.

Preliminary application of the device

Two cases ([case #2] and [case #1] that presented with and without co-existing diseases) were selected for preliminary comparison of missed items with and without the PDA and each patient was seen by two residents (both within 10 months of training: with/without the device). The count of the missing items for residents without the PDA is presented together with the total number of items identified with the PDA in Table 1.

	Hx	PE	tests
DM [case #1 only]	4/14	3/6	0/6
Atherosclerosis	1/9	1/7	0/14
Hypertension	0/4	4/8	0/13
Asthma	13/19	9/13	0/15
Chronic renal failure	8/16	2/10	1/7
Hepatitis	6/11	5/13	0/14

Table 1: Missing items without the PDA/total number of items identified with the PDA

The time required for the assessments with the device was 65 [case #1] and 81 [case #2] minutes, respectively. Without the device, it was 51 + 15 (2nd assessment for the missing items) [case #1] and 71 + 15 (2nd assessment) [case #2], respectively. The time for the trip to the ward from the OR was excluded.

Conclusion

We developed wireless PDA software that assists anesthesiologists in preoperative assessment. As a preliminary study, the device was tested in a real clinical setting. It was observed that the assessment with the device was more complete than the one without the device in a limited number of the cases, and the time was not prohibitive. The preliminary data suggest that there is a role for PDAs in pre-operative assessment. Further studies are necessary to validate our results.